

REMARKS

Applicants have studied the final Office Action dated January 14, 2004 and have made amendments to Claim 1. It is submitted that the application, as amended, is in condition for allowance. By virtue of this amendment, claims 1-10, 15 and 17 are pending. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks is respectfully requested.

In the Office Action, the Examiner:

- (1-2) Rejected claims 1, 2, 4, and 17 under 35 U.S.C. §103(a) as being unpatentable over Kircher et al. (U.S. 4,942,554) in view of Jang et al. (U.S. 5,637,529);
- (3) Rejected claims 3 and 5 under 35 U.S.C. §103(a) as being unpatentable over Kircher et al. (U.S. 4,942,554) and Jang et al. (U.S. 5,637,529) as applied to claims 1 and 2, above and further in view of one of ordinary skill in the art; and
- (4) Rejected claims 6-10 and 15 under 35 U.S.C. §103(a) as being unpatentable over Kircher et al. (U.S. 4,942,554) and Jang et al. (U.S. 5,637,529) as applied to claims 1 and 2 above, and further in view of Lill et al. (U.S. 6,074,954) and in view of Numazawa et al. (U.S. 6,168,996).

(1-2) Rejection under 35 U.S.C. §103(a) in view of Kircher and Jang

As noted above, the Examiner rejected claims 1, 2, 4, and 17 under 35 U.S.C. §103(a) as being unpatentable over Kircher et al. (U.S. 4,942,554) in view of Jang et al. (U.S. 5,637,529). Independent claim 1 has been amended to distinguish over Kircher taken alone and/or in view of Jang.

As the Examiner correctly states on page 2 of the Office Action, *Kircher does not teach amorphizing the single crystal lattice of substance around a periphery of the recess* and the Examiner goes on to combine Kircher with Jang.¹

¹ Applicants make no statement on whether such combination is even proper.

Jang teaches a method for forming an element isolation insulating film of semiconductor devices, which can remove the lattice defects. The use of this film improves the yield and productivity of semiconductor devices. See Jang at col. 1, lines 45-50. In particular, Jang teaches that the implantation of germanium impurities in a trench 39, to form an amorphous region 43, which leads to the removing of the lattice defects occurring upon forming the trench. See Jang at col. 2, lines 37-60, FIGs 1A-1C, and claim 1. The semiconductor substrate is then recovered by crystallizing the amorphous region by a solid phase epitaxy process. See Jang at col. 2, lines 52-54, claim 1 (Emphasis Added).

Turning to Kircher, disclosed is a structure illustrated in figure 4, as taught by Kircher at col. 3, lines 61-64 *"the polycrystalline silicon 5, that fills out the trench 2, is etched back by approximately 0.5 um, creating a depression (illustrated by the arrow 6)."*

Combining these two references as suggested by the Examiner provides the removal of the lattice defects as taught by Jang occurring upon forming the trench 6 as taught by Kircher. This combination of Kircher and Jang, as suggested by the Examiner, results in a formation of an amorphous region by implantation of germanium impurities, and then crystallizes the amorphized region by a solid phase epitaxy process.

Continuing further, using the method as taught by Kircher, a silicon oxide 7 is introduced into the trench 6 formed in FIG. 4. Next, amorphous silicon 8 is deposited on the surface on the substrate, and recrystallized. See Kircher col. 4, lines 1-20 and FIG. 5.

Thus, one skilled in the art, by combining the teachings of Kircher with Jang, results in depositing a layer of amorphous material on a crystallized structure, not an amorphous structure because the amorphous region is immediately crystallized. See Jang at col. 2, lines 52-54. In contrast, independent claim 1, as amended, clarifies that a amorphized single-crystal lattice is formed by:

c) depositing a layer of amorphous material having the same chemical composition as that of the substrate on a structure obtained after amorphizing in

step b

Accordingly, independent claim 1 distinguishes over Kircher taken alone and/or in view of Jang for at least this reason.

Further, Kircher expressly teaches depositing the amorphous layer 8 on an isolating silicon oxide layer 7, and not directly on the substrate 5. By combining the teachings of Jang and Kircher, it was not possible for one skilled in the art to deposit a layer of amorphous material on an amorphized structure. In the present invention, the annealing of an amorphous material made of an amorphized structure covered with a layer of amorphous material leads to the obtaining of a substrate with a single-crystal lattice which makes it possible to repair the local defects, to ensure planarity and surface homogeneity allowing the formation of an epitaxial layer of silicon free of crystal defects. See page 2, lines 10 through page 4, line 25 of the specification of the present invention as originally filed. No new matter has been added.

The Federal Circuit has consistently held that when a §103 rejection is based upon a modification of a reference that destroys the intent, purpose or function of the invention disclosed in the reference, such a proposed modification is not proper and the *prima facie* case of obviousness can not be properly made. See *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Here the intent, purpose and function of Kircher taken alone and/or in view of Jang as cited by the Examiner is depositing a layer of amorphous material on a crystallized structure, where the amorphous layer is deposited on an isolating silicon oxide layer. In contrast, the present invention recites "*depositing a layer of amorphous material [...] on a structure obtained after amorphizing*" where the amorphous layer is deposited directly on the substrate. Accordingly, independent claim 1 distinguishes over Kircher taken alone and/or in view of Jang for at least this reason as well.

For the foregoing reasons, independent claim 1, distinguishes over Kircher taken alone or in view of Jang. Claims 2, 4, and 17 depend from claim 1. Since dependent claims contain all the limitations of the independent claims, claims 2, 4 and 17 distinguish over Kircher in view of Jang, as well, and the Examiner's rejection should be withdrawn.

(3) Rejection under 35 U.S.C. §103(a) in view of Kircher et al.,

Jang et al. and Official Notice

As noted above, the Examiner rejected claims 3 and 5 under 35 U.S.C. §103(a) as being unpatentable over Kircher et al. (U.S. 4,942,554) and Jang et al. (U.S. 5,637,529) as applied to claims 1 and 2 above and further in view of one of ordinary skill in the art.² Independent claim 1, has been amended to distinguish over Kircher and/or in view of Jang and/or in further view of one of ordinary skill in the art.

For the foregoing reasons in the section above entitled "(1-2)Rejection under 35 U.S.C. §103(a) in view Kircher and Jang", independent claim 1, as clarified by amendment, distinguishes over Kircher taken alone or in view of the Official Notice. The Examiner recites 35 U.S.C. §103. The Statute expressly requires that obviousness or non-obviousness be determined for the claimed subject matter "as a whole" and the key to proper determination of the differences between the prior art and the present invention is giving full recognition to the invention "as a whole." The Kircher reference taken alone and/or in view of Jang simply does not suggest, teach or disclose the patentably distinct limitation of: "depositing a layer of amorphous material [...] on a structure obtained after amorphizing" where the amorphous layer is deposited on directly on the substrate.

Further, if the Examiner's is citing "common knowledge" or facts based within the personal knowledge of the Examiner, for planarization by chemical-mechanical polishing for a structure formed by "depositing a layer of amorphous material [...] on an on a structure obtained after amorphizing" where the amorphous layer is deposited on directly on the substrate, the Applicants respectfully request that the Examiner support these references by filing an affidavit as allowed under MPEP §707 citing 37 CFR 1.104(d)(2).

² Applicants make no statement on whether such combination is even proper.

Claims 3 and 5 depend from claim 1. Since dependent claims contain all the limitations of the independent claims, claims 3 and 5 distinguish over Kircher in view of Examiner's statement of ordinary skill in the art as well.

(4) Rejection under 35 U.S.C. §103(a) in view of
Kircher et al., Jang et al., Lill et al. and Numazawa et al.

As noted above, the Examiner rejected claims rejected claim 6-10 under 35 U.S.C. §103(a) as being unpatentable over Kircher et al. (U.S. 4,942,554) and Jang et al. (U.S. 5,637,529) as applied to claims 1 and 2 above and further in view of Lill et al. (U.S. 6,074,954) and in view of Numazawa et al. (U.S. 6,168,996). Independent claim 1 has been amended to distinguish over Kircher and/or in view of Jang and/or in view of Lill and/or in further view of Numazawa.

For the foregoing reasons in the section above entitled "(3) Rejection under 35 U.S.C. §103(a) in view Kircher and Jang", independent claim 1, as clarified by amendment, distinguishes over Kircher and/or in view of Jang and/or in view of Lill and/or in further view of Numazawa because Kircher, Jang, Lill and Numazawa are silent on "*depositing a layer of amorphous material [...] on a structure obtained after amorphizing*" where the amorphous layer is deposited on directly on the substrate. Claims 6-10 and 15 depend from claim 1. Since dependent claims contain all the limitations of the independent claims, claims 6-10 and 15 distinguish over Kircher and/or in view of Jang and/or in view of Lill and/or in view of Numazawa as well.

CONCLUSION

The remaining cited references have been reviewed and are not believed to affect the patentability of the claims.

In this Response, Applicants have amended certain claims. In light of the Office Action, Applicants believe these amendments serve a useful clarification purpose, and are desirable for clarification purposes, independent of patentability. Accordingly,

Applicants respectfully submit that the claim amendments do not limit the range of any permissible equivalents.

Applicants acknowledge the continuing duty of candor and good faith to disclosure of information known to be material to the examination of this application. In accordance with 37 CFR §1.56, all such information is dutifully made of record. The foreseeable equivalents of any territory surrendered by amendment is limited to the territory taught by the information of record. No other territory afforded by the doctrine of equivalents is knowingly surrendered and everything else is unforeseeable at the time of this amendment by the Applicants and their attorneys.

Applicants respectfully submit that all of the grounds for rejection stated in the Examiner's Office Action have been overcome, and that all claims in the application are allowable. No new matter has been added. It is believed that the application is now in condition for allowance, which allowance is respectfully requested.

PLEASE CALL the undersigned if that would expedite the prosecution of this application.

Respectfully submitted,

Date: April 14, 2004

By: 

Jon Gibbons, Reg. No. 37, 333
Attorney for Applicants
FLEIT, KAIN, GIBBONS,
GUTMAN, BONGINI, & BIANCO P.L.
551 N.W. 77th Street, Suite 111
Boca Raton, FL 33487
Tel (561) 989-9811
Fax (561) 989-9812

Please Direct All Future Correspondence to Customer Number **23334**

00-GR1-239

10

10/044,402